

REMARKS

This is a full and timely response to the outstanding non-final Office Action mailed April 13, 2006. The Applicants traverse the rejections to claims 1-20. Reconsideration and allowance of the subject application and presently pending claims 1-20 is respectfully requested.

II. Response To Claim Rejections Based On Obviousness

In the Office Action, Claims 1-5, 7-8, and 12-20 are rejected under 35 USC§103(a) as being unpatentable over U.S. Patent No. 6,282,104 to Kern (hereinafter "Kern") in view of U.S. Patent No. 5,521,487 to Liu (hereinafter "Liu"). Claim 6 is rejected under 35 USC§103(a) as being unpatentable over U.S. Patent No. 6,282,104 to Kern in view of U.S. Patent No. 5,521,487 to Liu as applied to claim 1 and further in view of U.S. Patent No. 5,179,489 to Oliver. Claims 9-11 are rejected under 35 USC§103(a) as being unpatentable over U.S. Patent No. 6,282,104 to Kern in view of U.S. Patent No. 5,521,487 to Liu as applied to claim 1 and further in view of *A Practical Approach to Harmonic Current Compensation by a Single-Phase Active Filter*. It is well established at law that, for a proper rejection of a claim under 35 U.S.C. §103 as being obvious based upon a combination of references, the cited combination of references must disclose, teach, or suggest, either implicitly or explicitly, all elements/features/steps of the claim at issue. See, e.g., In re Dow Chemical, 5 U.S.P.Q. 2d 1529, 1531 (Fed. Cir. 1988), and In re Keller, 208 U.S.P.Q. 871, 881 (C.C.P.A. 1981).

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A. Claim 1

Claim 1 is presently written as:

1. A DC mitigation circuit, comprising:
a control circuit for evaluating *an amount of DC current resulting from the DC in a transmission line*; and
switches for providing a current into a winding of a transformer, said switches being controlled by said control circuit,
wherein said current provided to said winding generates a magnetic flux that *offsets a flux created by said DC current* resulting from the DC in said transmission line.

(Emphasis added).

Claim 1 is preliminarily rejected as obvious over Kern in view of Liu. Kern teaches a device for sensing DC offset, caused by various loads, and providing an in-line DC offset to counter the sensed DC offset. Kern does not address DC flux in a transformer. Liu teaches an active filter for filtering the current and improving the power factor of the single-phase overhead contact wire by compensating the harmonic frequencies generated and optionally the reactive power consumed by the traction equipment and the auxiliary equipment.

The Applicants respectfully submit that Kern in view of Liu fails to teach, disclose, or suggest at least the above-emphasized element of claim 1. Specifically, Kern in view of Liu fails to at least teach, disclose, or suggest evaluating DC current on a transmission line. Liu teaches overhead catenaries for locomotives. Kern teaches distributed generation power conversion. Neither of these patents is directed towards transmission lines. Further, Kern's insertion of a transformer would not be workable for a transmission line arrangement. Its insertion would not be allowed in-line along transmission lines for safety reasons, since a failure could cause unsafe voltage excursions and/or unsafe current amplitudes to occur.

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Kern in view of Liu fails to at least teach, disclose, or suggest providing current to a winding to offset the magnetic flux caused by DC current. Liu is limited to sensing and eliminating harmonic current by applying a voltage across a winding. Kern is directed to correcting and evaluating DC current resulting from load devices and providing an offset to the line to correct DC current. Neither reference teaches or discloses applying a current to a winding to offset a flux created by DC current and neither reference teaches or discloses how to correct DC current originating in the transmission line.

With respect to the difference between DC on a transmission line and harmonics, the Applicants respectfully disagree with the Examiner's reading of the references cited on page 2 of the 4/13/06 office action. Specifically, the IEEE publication cited appears to suggest that a DC drive can cause harmonic disturbances, but it does not mention that DC current causes harmonics. The Applicants cannot find suggestion in the IEEE publication reflecting the Examiner's comment that "the presence of harmonics in a transmission line leading to the generation and problem of DC current." The IEEE publication appears to be limited, not only to harmonics, but to odd harmonics, which is traditionally the primary harmonics concern. Nor is that comment from the office action reflected in any of the language of U.S. Patent No. 4,292,545 to Hingorami. Further, the present application, as discussed at least in the background, is directed toward DC current caused by one or more geophysical events. To the extent it is the Examiner's theory that Liu teaches introducing harmonics to a system thereby voiding DC currents the Examiner believes result therefrom, the Applicants cannot believe it is a good idea to introduce harmonics to a transmission line to correct DC current problems, or that there is motivation to trade one problem for another.

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As Kern in view of Liu fails to at least teach, disclose, or suggest evaluating DC current in a line and offsetting the magnetic flux caused by DC current, the Applicants respectfully request allowance of claim 1.

Further, the motivation for combining references is in error. The office action states, "it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Kern to use a connection to a transformer by switches of Liu to mitigate the DC and harmonics in a transmission line to simplify the device and provide a clean and level power signal provided to loads." However, the DC offset provided by Kern seems far simpler than the array of bridges provided in Liu, much less connecting to a transformer winding. There is also no suggestion in Liu that the bridges and use of the winding provides a cleaner or more level power signal than the DC offset of Kern. At the basest level, there is also no suggestion in either reference that DC can be mitigated by a connection to a transformer. As there is no motivation to combine the references, the Applicants respectfully request allowance of claim 1.

B. Claims 2-12 and 20

The Applicants respectfully submit that since claims 2-12 and 20 depend on independent claim 1, claims 2-12 and 20 contain all limitations of independent claim 1. Since independent claim 1 should be allowed, as argued above, pending dependent claims 2-12 and 20 should be allowed as a matter of law for at least this reason. In re Fine, 5 U.S.P.Q. 2d 1596, 1608 (Fed. Cir. 1988).

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C. Claim 13

Claim 13 is presently written as:

13. A method of performing DC mitigation, comprising the steps of:
evaluating an amount of DC and harmonic current resulting from the DC in a transmission line;
providing a current into a winding of a transformer based on said evaluated amount of DC or harmonic currents resulting from the DC; and
generating a magnetic flux that offsets a flux created by said DC and harmonic currents resulting from the DC in said transmission line.

(Emphasis added).

Claim 13 is preliminarily rejected as obvious over Kern in view of Liu. Kern teaches a device for sensing DC offset, caused by various loads, and providing an in-line DC offset to counter the sensed DC offset. Kern does not address DC flux in a transformer. Liu teaches an active filter for filtering the current and improving the power factor of the single-phase overhead contact wire by compensating the harmonic frequencies generated and optionally the reactive power consumed by the traction equipment and the auxiliary equipment.

The Applicants respectfully submit that Kern in view of Liu fails to teach, disclose, or suggest at least the above-emphasized element of claim 13. Specifically, Kern in view of Liu fails to at least teach, disclose, or suggest evaluating DC current on a transmission line. Liu teaches overhead catenaries for locomotives. Kern teaches distributed generation power conversion. Neither of these patents is directed towards transmission lines. Further, Kern's insertion of a transformer would not be workable for a transmission line arrangement. Its insertion would not be allowed in-line along transmission lines for safety reasons, since a failure could cause unsafe voltage excursions and/or unsafe current amplitudes to occur.

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Kern in view of Liu fails to at least teach, disclose, or suggest providing current to a winding to offset the magnetic flux caused by DC current. Liu is limited to sensing and eliminating harmonic current by applying a voltage across a winding. Kern is directed to correcting and evaluating DC current resulting from load devices and providing an offset to the line to correct DC current. Neither reference teaches or discloses applying a current to a winding to offset a flux created by DC current and neither reference teaches or discloses how to correct DC current originating in the transmission line.

With respect to the difference between DC on a transmission line and harmonics, the Applicants respectfully disagree with the Examiner's reading of the references cited on page 2 of the 4/13/06 office action. Specifically, the IEEE publication cited appears to suggest that a DC drive can cause harmonic disturbances, but it does not mention that DC current causes harmonics. The Applicants cannot find suggestion in the IEEE publication reflecting the Examiner's comment that "the presence of harmonics in a transmission line leading to the generation and problem of DC current." The IEEE publication appears to be limited, not only to harmonics, but to odd harmonics, which is traditionally the primary harmonics concern. Nor is that comment from the office action reflected in any of the language of U.S. Patent No. 4,292,545 to Hingorami. Further, the present application, as discussed at least in the background, is directed toward DC current caused by one or more geophysical events. To the extent it is the Examiner's theory that Liu teaches introducing harmonics to a system thereby voiding DC currents the Examiner believes result therefrom, the Applicants cannot believe it is a good idea to introduce harmonics to a transmission line to correct DC current problems, or that there is motivation to trade one problem for another.

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As Kern in view of Liu fails to at least teach, disclose, or suggest evaluating DC current in a line and offsetting the magnetic flux caused by DC current, the Applicants respectfully request allowance of claim 13.

Further, the motivation for combining references is in error. The office action states, "it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Kern to use a connection to a transformer by switches of Liu to mitigate the DC and harmonics in a transmission line to simplify the device and provide a clean and level power signal provided to loads." However, the DC offset provided by Kern seems far simpler than the array of bridges provided in Liu, much less connecting to a transformer winding. There is also no suggestion in Liu that the bridges and use of the winding provides a cleaner or more level power signal than the DC offset of Kern. At the basest level, there is also no suggestion in either reference that DC can be mitigated by a connection to a transformer. As there is no motivation to combine the references, the Applicants respectfully request allowance of claim 13.

D. Claims 14-18

The Applicants respectfully submit that since claims 14-18 depend on independent claim 13, claims 14-18 contain all limitations of independent claim 13. Since independent claim 13 should be allowed, as argued above, pending dependent claims 14-18 should be allowed as a matter of law for at least this reason. In re Fine, 5 U.S.P.Q. 2d 1596, 1608 (Fed. Cir. 1988).

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E. Claim 19

Claim 19 is presently written as:

19. A DC mitigation circuit, comprising:
means for evaluating an amount of DC or harmonic current resulting from the DC in a transmission line; and
means for providing a current into a winding of a transformer, said means for providing a current into said winding being controlled by said means for evaluating,
wherein said current provided to said winding generates a magnetic flux that offsets a flux created by said DC or harmonic current resulting from the DC in said transmission line.

(Emphasis added).

Claim 19 is preliminarily rejected as obvious over Kern in view of Liu. Kern teaches a device for sensing DC offset, caused by various loads, and providing an in-line DC offset to counter the sensed DC offset. Kern does not address DC flux in a transformer. Liu teaches an active filter for filtering the current and improving the power factor of the single-phase overhead contact wire by compensating the harmonic frequencies generated and optionally the reactive power consumed by the traction equipment and the auxiliary equipment.

The Applicants respectfully submit that Kern in view of Liu fails to teach, disclose, or suggest at least the above-emphasized element of claim 19. Specifically, Kern in view of Liu fails to at least teach, disclose, or suggest evaluating DC current on a transmission line. Liu teaches overhead catenaries for locomotives. Kern teaches distributed generation power conversion. Neither of these patents is directed towards transmission lines. Further, Kern's insertion of a transformer would not be workable for a transmission line arrangement. Its insertion would not be allowed in-line along transmission lines for safety reasons, since a failure could cause unsafe voltage excursions and/or unsafe current amplitudes to occur.

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With respect to the difference between DC on a transmission line and harmonics, the Applicants respectfully disagree with the Examiner's reading of the references cited on page 2 of the 4/13/06 office action. Specifically, the IEEE publication cited appears to suggest that a DC drive can cause harmonic disturbances, but it does not mention that DC current causes harmonics. The Applicants cannot find suggestion in the IEEE publication reflecting the Examiner's comment that "the presence of harmonics in a transmission line leading to the generation and problem of DC current." The IEEE publication appears to be limited, not only to harmonics, but to odd harmonics, which is traditionally the primary harmonics concern. Nor is that comment from the office action reflected in any of the language of U.S. Patent No. 4,292,545 to Hingorami. Further, the present application, as discussed at least in the background, is directed toward DC current caused by one or more geophysical events. To the extent it is the Examiner's theory that Liu teaches introducing harmonics to a system thereby voiding DC currents the Examiner believes result therefrom, the Applicants cannot believe it is a good idea to introduce harmonics to a transmission line to correct DC current problems, or that there is motivation to trade one problem for another.

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As Kern in view of Liu fails to at least teach, disclose, or suggest evaluating DC current in a line and offsetting the magnetic flux caused by DC current, the Applicants respectfully request allowance of claim 19.

Further, the motivation for combining references is in error. The office action states, "it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Kern to use a connection to a transformer by switches of Liu to mitigate the DC and harmonics in a transmission line to simplify the device and provide a clean and level power signal provided to loads." However, the DC offset provided by Kern seems far simpler than the array of bridges provided in Liu, much less connecting to a transformer winding. There is also no suggestion in Liu that the bridges and use of the winding provides a cleaner or more level power signal than the DC offset of Kern. At the basest level, there is also no suggestion in either reference that DC can be mitigated by a connection to a transformer. As there is no motivation to combine the references, the Applicants respectfully request allowance of claim 19.

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CONCLUSION

In light of the foregoing amendments and for at least the reasons set forth above, Applicants respectfully submit that all objections and rejections have been traversed, rendered moot and/or accommodated, and that presently pending claims 1-20 are in condition for allowance. Favorable reconsideration and allowance of the present application and the presently pending claims are hereby courteously requested. If in the opinion of the Examiner, a telephonic conference would expedite the examination of this matter, the Examiner is invited to call the undersigned attorney at (603) 668-1400.

Respectfully submitted,


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I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on July 13, 2006 at Manchester, New Hampshire.

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